

# AM16/32B

## Relay Multiplexer

The AM16/32B Relay Multiplexer increases the number of sensors that can be measured by a datalogger. It multiplexes 16 groups of four lines (a total of 64 lines) through four common (COM) terminals. Alternatively, a manual switch setting allows the AM16/32B to multiplex 32 groups of two lines (also a total of 64 lines) through two COM terminals.

The AM16/32B supports two clocking modes. Clocking mode A sequentially advances through each channel. Whereas clocking mode B uses a relay address to go directly to a specific channel, which reduces power consumption and wear on the relay switches.

The AM16/32B is compatible with most of our dataloggers (not compatible with the CR200(X) series or CR510). The maximum distance between the datalogger and the AM16/32B is determined by the sensors used, the datalogger's scan rate, and the cable used in the application.

### Features/Benefits

- Increases system channel capacity
- Decreases the cost of cabling individual sensors on long wire runs
- Reduces power consumption and wear on the relay switches by using a relay address to go directly to a specific channel.
- Contains gas tubes on all of the inputs and a ground lug for better surge protection
- Includes strain relief for sensor leads and independent routing for sensor shield lines
- Compatible with thermistors, potentiometers, load cells, strain gages, vibrating wires, water content reflectometers, and gypsum soil moisture blocks; AM25T is recommended for multiplexing thermocouples



When multiple sensor types are connected to the AM16/32B, Mode B allows one sensor type to be measured more frequently than the other sensor type.

### Maximum Number of Sensor Connections

The maximum number of sensors multiplexed through one AM16/32B depends on the type(s) of sensors measured. For example, assuming identical sensors, the AM16/32B can multiplex:

- Up to 32 single-ended or differential sensors that require two wires (e.g., thermistors, half bridges)
- Up to 16 single-ended or differential sensors that require four wires (e.g., full bridges, four-wire half bridges)
- Up to 32 vibrating wire sensors (16 with temperature) in conjunction with a AVW1, AVW4, AVW100, or AVW200-series Vibrating Wire Interface
- Up to 48 half-bridge measurements (assumes common excitation and completion resistors at the datalogger)
- Up to 48 CS616 Water Content Reflectometers (assumes common excitation)
- Up to 32 gypsum soil moisture blocks (model 223 or 253). The AM16/32B eliminates the requirement for dc blocking capacitors, significantly reducing sensor cost

### Environmental Enclosures

The AM16/32B operates in most field conditions but requires a non-condensing environment. A weather-resistant enclosure equipped with desiccant is required for field use. The ENC10/12 is the enclosure of choice for multiplexers housed at a distance from the datalogger.

If the AM16/32B is to be housed in the datalogger's enclosure, one AM16/32B, a CR800, CR850, CR1000, CR3000, or CR10X datalogger, and a PS100 power supply will fit in an ENC12/14. For convenience in wiring, a larger enclosure (e.g., ENC16/18) is recommended.

## Software Support

Short Cut version 1.1 or higher (available at no charge from our website) supports simple programs and generates wiring diagrams for AM16/32B applications. More complicated programs may be generated using PC400 or LoggerNet datalogger support software.



Short Cut is available from our website (at no charge) and Resource CD. It is also bundled with Campbell Scientific's PC400 and LoggerNet Datalogger Support Software.

## Datalogger Connections

### COM Terminals

When used in a 2 x 32 mode, the CABLE3CBL cable is recommended for connecting the measurement/excitation channels of the datalogger with the COM terminals of the multiplexer. For the 4 x 16 mode, the CABLE4CBL is typically used; the CABLE5CBL is recommended when it is desirable to connect both shields.

### Reset and Clock Terminals

The CABLE4CBL is recommended to supply power and control signals from the datalogger to the AM16/32B. The AM16/32B requires one datalogger control port for enable (reset terminal), and a second control port to advance through the channels (clock terminal).

### Cable Lengths

A 2-foot cable length should be sufficient if the datalogger and AM16/32B are housed in an ENC16/18 environmental enclosure.

## Scanning Multiple AM16/32Bs

Several AM16/32Bs may be connected to the same datalogger depending on the number of control ports and analog inputs available. For example, some customers have connected six multiplexers to one datalogger. This assumes adequate analog inputs, plus eight control ports, two for clock lines and six for enable lines, are available.

## Power Considerations

The AM16/32B draws less than 210 microamps quiescent, 6 milliamps active—so power considerations are heavily tied to the percentage of time in quiescent versus active states. Use of a relay address can reduce power consumption by minimizing the time spent in an active state.

In most applications, the datalogger's sealed rechargeable power supply should be more than sufficient; the datalogger's alkaline power supply can be used in applications where the multiplexer is activated infrequently.

## Ordering Information

### Multiplexer

AM16/32B 16 or 32 Channel Relay Multiplexer

### Temperature Ranges (choose one)

-ST Tested -25° to +50°C

-XT Tested -55° to +85°C

### Cables (see Datalogger Connections)

**CABLE3CBL-L** 3-conductor, 22-AWG cable with drain wire and Santoprene jacket. Enter cable length, in feet, after the -L. Must choose a cable termination option (see below).

**CABLE4CBL-L** 4-conductor, 22-AWG cable with drain wire and Santoprene jacket. Enter cable length, in feet, after the -L. Must choose a cable termination option (see below).

**CABLE5CBL-L** 5-conductor, 24-AWG cable with drain wire and Santoprene jacket. Enter cable length, in feet, after the -L. Must choose a cable termination option (see below).

### Cable Termination Options (choose one)

-PT Cable terminates in stripped and tinned leads for direct connection to a datalogger's terminals.

-PW Cable terminates in connector for attachment to a prewired enclosure.

# Specifications<sup>1</sup>

## Electrical

<b>Power<sup>2</sup>:</b>	9.6 to 16 Vdc
<b>Current Drain (typical)</b>	
Quiescent:	<210 $\mu$ A
Active:	6 mA
<b>Reset Levels</b>	
Inactive:	<0.9 V
Active:	3.3 to 8 V
<b>Clock Levels:</b>	
Scan Advance:	Occurs on the leading edge of the clock pulse transition (from below 1.5 V to above 3.3 V).
Maximum Voltage:	8 Vdc
<b>Minimum Clock Pulse Width:</b>	1 ms
<b>Maximum Actuation Time for Relay:</b>	20 ms
<b>Relay Operation:</b>	break before make
<b>Initial Relay Resistance, Closed:</b>	0.1 Ohm
<b>Maximum Switching Current<sup>3</sup>:</b>	500 mA
<b>Minimum Contact Life:</b>	10 <sup>7</sup> closures
<b>CE Compliance:</b>	EN 61326: 1998 EN 55022: 1998 Class B

## ESD

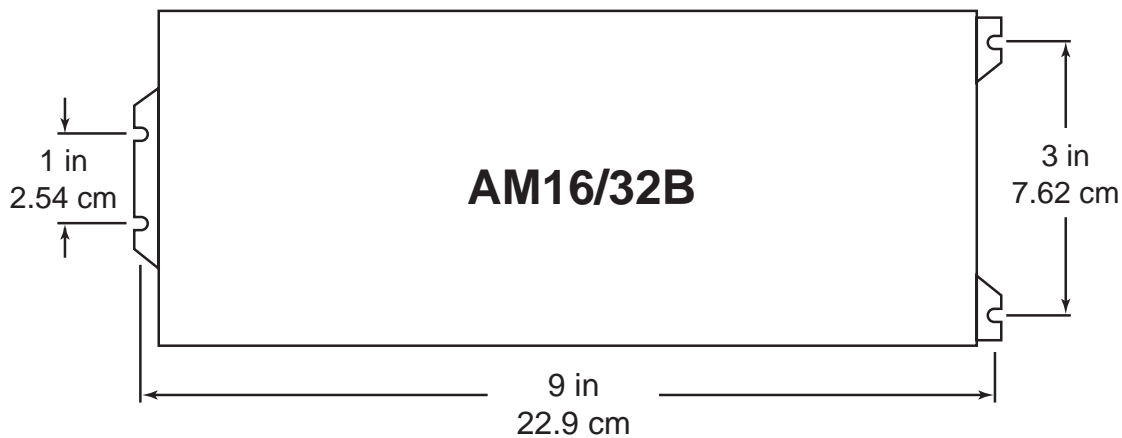
<b>Air Discharge::</b>	Complies with IEC61000-4-2, test level 4 ( $\pm$ 15 kV)
<b>Contact Discharge:</b>	Complies with IEC61000-4-2, test level 4 ( $\pm$ 8 kV)
<b>Surge:</b>	Complies with IEC61000-4-5, test level 3 ( $\pm$ 2 kV, 2 ohms coupling impedance)

## Physical

<b>Operating Temperature</b>	
Standard:	-25° to +50°
Extended:	-55° to +85°C
<b>Operating Humidity:</b>	0 to 95%, non-condensing
<b>Dimensions:</b>	4.0-in. W x 9.4-in. L x 1.8-in. D (10.2-cm x 23.9-cm x 4.6-cm)
<b>Weight:</b>	1.5 lb (0.7 kg)

## Mounting

<b>Enclosure to Pipe:</b>	1.25-in. IPS pipe (1.660-in. OD); 3.175 cm (4.22 cm OD)
<b>AM16/32B in Enclosure:</b>	compatible with 1-in. on center hole grid (see footprint below)



<sup>1</sup>If you have questions concerning the use of the AM16/32B in your application, please call Campbell Scientific at (435) 753-2342.

<sup>2</sup>The power requirements for AM16/32B multiplexers with serial numbers less than 5056 were 11.3 to 16 Vdc (under load; -25° to +50°C) and 11.8 to 16 Vdc (under load; -55° to +85°C).

<sup>3</sup>Switching currents greater than 30 mA (occasional 50 mA acceptable) degrade the suitability of that channel for switching low-voltage signals.

